REMARKS

Claims 1-17, 19-21 and 46-54 and 71-73 are pending in this application. Claims 7, 10, 13, 14, 17, 19, 20, and 71-73 are withdrawn. Claims 1-4, 8, 9, 11 12, and 70 were rejected. Claims 5, 6, 15, and 16 were objected to. Applicants gratefully acknowledge the allowance of claims 21 and 46-54.

The following remarks are submitted for the Examiner's consideration prior to the Interview scheduled for Wednesday, July 18, 2007 with the Examiner.

Claim Rejections §103(a)

Claims 1-4, 9, 11, 12, and 70 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,863,012 to Rollet et al. ("Rollet") in view of U.S. Patent No. 5,901,927 to Ho ("Ho"). Applicants respectfully request reconsideration of this objection.

With respect to independent claim 1 and dependent claims 9 and 11, the Examiner states that Rollet inherently discloses that constant vertical state is controlled. (Office Action, p. 3.) Applicants respectfully disagree on the ground that the Examiner has not understood the Applicants' invention and what is disclosed in Rollet.

Applicants' invention relates to a method and system for cueing a vehicle operator as to maximum allowable longitudinal and lateral accelerations and decelerations that may be performed while maintaining a constant vertical state without disengagement therefrom (Specification, par. 0014). In contrast, Rollet describes a system for adjusting the trimmed position of the longitudinal control inceptor in an aircraft in order to maintain "Longitudinal

Static Stability" (Rollet, Abstract). In order to achieve this stability, the invention of Rollet teaches against maintaining a constant vertical state.

> From a position of equilibrium in which the cyclic stick MCy is free, the system shifts the anchorage point P and therefore drives said stick, because the pilot's hand is exerting no force on the grip. This results in pitch-attitude cyclic pitch commands which counter the speed-drift tendencies characteristic of statically unstable helicopters and restore stable behavior with a tendency to return to the steady speed. This tendency to return takes place by means of phugoid oscillations in speed and in altitude.

Rollet, col. 7, lines 55-63 (underlining added). See also, Rollet, col. 1, lines 57-63. Based on the foregoing, Rollet does not inherently disclose that constant vertical state is controlled as the Examiner asserts.

Also, claim 1 requires determining at least one vertical inceptor position required to maintain a vertical state via a controller. The Examiner states that "cyclic stick Mcy (see Rollet et al., figure 1) sends a signal a control signal to the flight control device CDV via a link e3. This solves the vertical state of the helicopter is controlled via the flight control device CDV. It concludes that Rollet et al. inherently discloses that constant vertical state is controlled." (Office Action, p. 3) Applicants respectfully disagree.

As previously discussed above, Rollet does not inherently disclose controlling vertical state. Further, cyclic stick Mcy of Rollet is not a vertical inceptor but a longitudinal inceptor. See, Rollet, col. 5, lines 54-58 ("Of course, in the known way, the cyclic pitch stick can be displaced, on the one hand, forward and backward for pitch-attitude control (double-headed arrow F1) and, on the other hand, from left to right and from right to left for roll-attitude control (double-headed arrow F2"). Also, cyclic pitch stick Mcy is associated with transducer Tcy which converts the position of the stick in terms of pitch attitude into electrical signals. (Rollet, col. 5,

lines 50-53). ("the sensor TCy sensing the pitch-attitude position of the cyclic stick Mcy, generating the electric signal cy on the link e3, said signal cy being representative of the positions of the cyclic stick in terms of pitch attitude." Rollet, col. 6, lines 43-47, underlining added) It is well known in the art that adjusting cyclic pitch attitude controls the longitudinal and lateral velocity of a helicopter and that the vertical velocity of a helicopter is controlled by adjusting the collective pitch. Based on the foregoing, cyclic stick Mcy of Rollet does not control the vertical state of the helicopter as the Examiner states but controls the cyclic pitch attitude.

Also, while Rollet does disclose a vertical inceptor, i.e., collective pitch lever Lco (Rollet, col. 5, lines 42-43, Fig. 1), Rollet does not disclose, teach or suggest determining at least one vertical inceptor position (i.e., the position of collective pitch lever Lco) required to maintain a vertical state. In fact, Rollet teaches that to achieve longitudinal static stability, the position of the vertical inceptor (i.e., collective pitch lever) remains constant and that only the position of the longitudinal inceptor (i.e., cyclic stick) must be adjusted. ("It is also known that on a helicopter, the longitudinal cyclic pitch (pitch control) applied to the blades of the main rotor which provides lift and forward motion increases (in the direction tending to tilt the rotor disk further forward), generally speaking, with the air speed, the rate of rotation and the collective pitch of this rotor moreover being kept constant. This phenomenon is generally known as positive longitudinal static stability." Rollet, col. 1, lines 29-36 (underlining added).

Claim 1 also requires determining maximum allowable vertical inceptor position limits for desired operation of the vehicle that allow maintaining said vertical state. The Examiner states that "Rollet et al. disclose a cyclic stick system for a helicopter, in which the cyclic stick is pushed or pulled at forces so that to accelerate or decelerate and then maintain a new higher or lower speed. Thus, Rollet et al. inherently disclose a maximum of the inceptor position limits in

order to maintain the vertical state." (Office Action, p. 3) Applicants respectfully disagree. As previously discussed above, the cyclic stick of Rollet is a longitudinal inceptor, not a vertical inceptor, and controls the longitudinal/lateral velocity of a helicopter rather than its vertical state. Also discussed above, Rollet teaches against maintaining a vertical state.

The Examiner also states that Rollet teaches "a cyclic stick system that control the speed stability of a helicopter in which maximum vertical inceptor position limits are based on the forces applied on the cyclic stick." (Office Action, p. 3) Applicants respectfully disagree on the ground that the Examiner misunderstood the teaching of Rollet. As discussed above, the cyclic stick of Rollet is not a vertical inceptor and the invention of Rollet teaches that the position of the vertical inceptor (i.e., the collective stick) remains constant. In addition, the forces applied to the cyclic stick of Rollet do not affect the vertical inceptor (i.e., the collective stick). Rather, the forces applied on the cyclic stick determine the shift applied to anchorage point P of the cyclic stick in order to maintain or regain the speed stability. See, Rollet at col. 7, line 54 to col. 8, line 14.

The Examiner states that Rollet fails to teach "determining maximum acceleration limits for the longitudinal or lateral axis corresponding to the maximum allowable vertical inceptor position limits." as required by claim 1. However, the Examiner further states that Ho teaches a system/method to prevent ground strike in which the tail strike pitch attitude limit is set to the maximum allowable pitch attitude for the autopilot mode in according the limited pitch command signal from pitch command limit box. The Examiner asserts that it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the aircraft system/method as taught by Rollet et al. to include the teaching of maximum acceleration limits as taught in Ho for providing the advantage of maintaining the aircraft at an allowable

elevation so that to maintain the aircraft in a desired flight path. This prevents great damage with other aircraft or an unwanted ground strikes. (Office Action, p. 4) Applicants respectfully disagree on the ground that the Examiner has misunderstood what is disclosed in Ho.

Ho discloses a method and apparatus for use with an aircraft autopilot to prevent an aircraft part from striking the ground during near ground maneuvers by employing a protection circuit between the outer loop and the inner loop of the control chain between the autopilot and the control surface. (Ho, Abstract). In situations where the inner loop is a pitch rate circuit (e.g., general landing situations), the protection circuit modifies the pitch rate command to lie between a maximum value HL and a minimum value LL so that the aircraft will have enough pitch maneuver capabilities but not large enough to cause passenger discomfort.. (Ho, col. 4, line 10 to Col. 5, line 5 and FIG. 4). In situations where the inner loop is an attitude rate circuit (i.e., go-arounds), the protection circuit modifies the pitch attitude command the limit to the maximum allowable pitch attitude for the autopilot mode that it is performing. For example, in case of a "go around" mode, the maximum pitch attitude command for the mode could be as high as 25 degrees, whereas the tail strike limit might be about 10 degrees. (Ho, col. 4, line 66 to Col. 5, line 44 and FIG. 5).

Regardless of whether the inner loop is a pitch rate circuit or an attitude rate circuit, the invention of Ho controls the <u>pitch</u> of the aircraft in order to prevent ground strikes. Nothing in Ho discloses, teaches, or suggests that controlling the pitch of the aircraft relates to or determines the maximum <u>acceleration limits</u> for the longitudinal or lateral axis as recited by claim 1.

Further, Rollet and Ho do not contain any suggestion that they be combined in the manner suggested by the Examiner. In fact, it would not have been obvious to modify the teaching of Rollet in light of Ho. This is because Rollet and Ho are directed to addressing

problems different from the problem addressed by Applicants' invention. Rollet is directed to a cyclic stick system that allows a helicopter to maintain or regain longitudinal static stability. (Rollet, col. 2, line 49-67). Ho is directed to controlling pitch rate or pitch attitude commands to prevent ground strikes during near-ground maneuvers such as take-offs, landings, and go-arounds. (Ho, col. 1, lines 5-10, Abstract). Neither Rollet nor Ho relate to the problem addressed by Applicants' invention which is determining the maximum allowable longitudinal and lateral accelerations and decelerations that may be performed while maintaining a constant vertical state without disengagement therefrom. (Specification, par. 0001)

In addition, Ho does not teach, disclose or suggest determining at least one vertical inceptor position required to maintain a vertical state via a controller or determining maximum allowable vertical inceptor position limits for desired operation of the vehicle that allow maintaining said vertical state as required by claim 1.

Based on the foregoing, Rollet and Ho, taken individually or in combination, fail to disclose all of the limitations recited on claim 1. Therefore, claim 1 is allowable over Rollet and Ho. Claims 2, 3, 4, 9, 11, 12 and 70 depend from claim 1 and are allowable over Rollet and Ho for the same reasons as their parent claim.

In addition, with respect to claim 4, the Examiner states that Ho "teaches maximum acceleration limited as represented as control inceptor position limits." (Office Action, p. 4) Applicants disagree. As discussed above, Ho is directed to controlling the <u>pitch</u> of an aircraft and does not disclose, teach or suggest determining acceleration limits. Further, the section of Ho cited by the Examiner (Ho, col. 5, lines 6-19) does not teach acceleration limits. Rather it teaches that in cases where the inner loop is an attitude rate circuit (e.g., go-arounds); the protection

circuit of Ho modifies the pitch attitude command the limit to the maximum allowable pitch attitude for the autopilot mode that it is performing.

With respect to claim 9, this claim recites the limitation that the <u>maximum acceleration limits</u> are based on the <u>transfer of potential and kinetic energy</u>. Neither Rollet nor Ho disclose, teach, or suggest this limitation.

Regarding claim 11, this claim recites the limitation that said <u>maximum acceleration limits</u> are determined <u>using at least two methods</u>, and the most restrictive result from the two methods is utilized. No such limitation is disclosed, taught, or suggested by Rollet or Ho.

With regard to claim 12, the Examiner states that Rollet inherently discloses constant vertical altitude, constant vertical velocity, and constant flight path angle so that the stability of the helicopter in vertical is maintained. (Office Action, p. 5) Applicants respectfully disagree. As discussed above with respect to claim 1, Rollet is directed to maintaining or regaining the longitudinal static stability which is not related to constant vertical altitude, constant vertical velocity, and constant flight path angle. In fact, Rollet teaches that in order to attain longitudinal static stability the helicopter must undergo oscillations in speed and altitude ("phugoid oscillations in speed and in altitude" (*supra.*).

Dependent claim 8 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Rollet, Ho, and further in view of U.S. Patent No. 6,334,592B1 to Tomio et al. ("Tomio") Applicants respectfully traverse this ground of rejection.

Claim 8 depends from claim 1 and is allowable over Rollet and Ho for the same reasons as its parent claim. Tomio is directed to a flight control apparatus for helicopters that can be easily applied to mechanical control transmission mechanisms mounted on existing helicopters,

and which can take advantages of the characteristics of the electrical type control transmission mechanism. (Tomio, col. 2, line 28-35) Tomio does not disclose, teach, or suggest a method for determining the maximum acceleration limits for the longitudinal or lateral axis of an aeronautical vehicle while maintaining a constant vertical state. Neither does Tomio disclose teach or suggest determining a vertical inceptor position required to maintain a vertical state, determining a maximum allowable vertical inceptor position limits that allows maintaining said vertical state, or determining the maximum acceleration limits for the longitudinal or lateral axis corresponding to the maximum allowable vertical inceptor position limits as recited in claim 1.

Based on the foregoing, Tomio, whether alone or in combination with Rollet and Ho fails to disclose all of the elements recited in claim 8. Therefore, claim 8 is allowable over Tomio, Rollet, and Ho.

Claims Objections

Claims 5, 6, 15, and 16 were objected to as being dependent upon a rejected base claim. The Examiner stated that these claims would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. However, Claims 5, 6, 15, and 16 depend on claim 1 and are allowable over Rollet and Ho for the same reasons given above for their parent claim. As such, Applicants have not rewritten or amended claims 5, 6, 15 and 16 in independent form

Conclusion

In view of the foregoing Remarks, Applicants submit that claims 1-6, 8, 9, 11, 12, 15, 16 and 70 are allowable and in a proper condition for allowance.

Respectfully Submitted,
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Dated: July 17, 2007

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